INTERNATIONAL CENTER FOR AGRICULTURAL RESEARCH IN THE DRY AREAS

Gender and Rangelands' Management in Tunisia with a focus on Medenine and Zaghouen

"Partnerships for Improving Pastoral Policies" PIPP

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Contents

Introduction

The “Partnerships for Improving Pastoral Policies” PIPP project has as its objective to update the Tunisian pastoral law and / or to develop a pastoral code. The approach involves multiple institutional levels that include local communities, national governments and international actors. The engagement of different stakeholders in the negotiation process is recognized and fostered. Furthermore, the approach aims to develop capacities of stakeholders involved. The capacity development focuses on enabling skills to activate and coordinate networks and to include women, youth and marginalized groups into the process. Skills development related to governance of common natural resources is also part of the process.

At present, the rules governing rangelands in Tunisia refer in general to certain sections of the forestry code and to the regulations governing collective lands which have shown their limitations. Comparable to the hima which is a communal property system developed by the nomadic pastoralists in the Middle East and North Africa. It restricted and regulated the use of lands for grazing, provided areas for use during droughts, and maintained the productivity of the rangelands. The current legislation in Tunisia has contributed to the disappearance of the traditional common rangelands governance system, which has defined rangeland resting periods and access for entitled user groups in order to preserve resources. The traditional system has now been replaced by a de facto “open access situation”, where access to rangelands cannot be managed or controlled in the traditional manner, thus resulting in uncontrolled cultivation with barley and overgrazing. Rain-fed farming is not sustainable on common rangelands as it increases erosion and soil degradation. The two workshops on rangeland governance organized by ICARDA and the Ministry of Agriculture confirmed the need and the urgency to develop specific tools for rangeland governance, the so called Tunisian pastoral code.

ICARDA is contributing to the facilitation, as well as provision of scientific advice and capacity development for key actor stakeholders. The ICARDA team will ensure, together with their partner, the General Directorate of Forestry (DGF) of the Ministry of Agriculture, that all concerned stakeholders, especially the affected user groups representing the communal rangelands of the country, are actively participating in the discussion (women and men), negotiation and decision making process of the new pastoral code.

The purpose of this study is to explore gender roles, relations, constraints and opportunities in livestock production with a focus on rangelands. Overall, there is very little research conducted on gender issues (such as roles, relations, and responsibilities) in rangelands in Tunisia. This study is therefore an important step towards filling this research gap and particularly bridging gender issues across roles, decision-making power, participation in public life and entrepreneurship, access to resources, innovation adoption, and adaptation to climate change.

Combining analysis of roles, decision-making power, adoption of innovation, adaptation to climate change, and access to resources with gender perspective helps draw a fuller picture of obstacles and gender gaps to rangelands use and management in rural areas and the ways women overcome them. The past decade has brought significant changes in rural areas of Tunisia which remain understudied, especially from a gender lens. These considerations are important for Tunisia as women increasingly participate in agriculture due to male out-migration.

Given the scarcity of the literature on gender and rangelands in Tunisia and more broadly, the report starts with a review of the literature on gender and agriculture in Tunisia drawing on the global literature when relevant. The methodology will follow and background to the two study sites. Sex-disaggregated findings related to rangeland use and management will be presented based on location, generation, class, and marital status. Lessons will be drawn from women and men participants in rangelands programs and entrepreneurs. Recommendations in improving rangelands will be provided based on the recommendations provided by women and men respondents.

A national workshop with key stakeholders revealed that gender stereotyping in (agricultural) policy making persist and as such the consideration of gender equity aspects are crucial during all of the negotiation processes facilitated by ICARDA and the General Directorate of Forestry because women and men have diverse and overlapping needs and potential in the use and management of rangelands.

Methodology and Background of the choice of the Study Sites

Before going in field a review of the existing literature; including published articles, grey literature, and statistics related to agriculture, has been done to strengthen the knowledge by exploring about the regional context where we work. While carrying out field visits we tried to respect the local norms through seeking the guidance of local contacts and of community members who have a good relationship before beginning our data collection through individual surveys and FGDs. While the interviews give us the perspectives of the household and the individuals, the FGDs give us perspectives at the community level (such as gender norms/rules, problems at community level, information about organizing collectively, etc.).

The selection of study communities was based on purposive, maximum diversity sampling in various ecosystems. The three case study areas of Medenine and Zaghouen differ in biophysical dynamics. Participants are selected based on their gender, marital status, social class, as well as participation in public life, projects, and entrepreneurship. The tables below illustrated the category of respondents in Medenine and Zaghouen for the interviewed samples via FGD or surveys (table 1 and 2). In the field, class was determined by local officials in the communities. This in turn was validated in the field through judging from quality of housing and assets owned by the respondents' households.

Table 1: Surveys and FGD in Zaghouen

Zaghouen: 20 men and 20 women (All respondents were involved in livestock production)					
Middle Class (depending on number of livestock heads or land size, which was verified and defined by local institution representatives)					
10 men 10 women	2 of 10 men 2 of 10 women	2 of 10 women	2 men or more (at least 2)	3 out of 10 men 3 out of 10 women	3 out of 10 men 3 out of 10 women
	leaders (economic or institutional)	heads of households (due to widowhood, separation, divorce or migration)	heads of their households	participants in development programs	neither participants in institutions, businesses, or development programs
Poor Class (depending on number of livestock heads or land size, which was verified and defined by local institution representatives)					
10 men 10 women	2 of 10 men 2 of 10 women	2 of 10 women	2 men or more (at least 2)	3 out of 10 men 3 out of 10 women	3 out of 10 men 3 out of 10 women
	leaders (economic or institutional)	heads of households (due to widowhood,	heads of their households	participants in development	neither participants in institutions,

		separation, divorce or migration)		programs	businesses, or development programs
Zaghouen: 4 FGDs (All respondents were involved in livestock production)					
Middle Class	2 FGDs : 1 with 10 men and1 with 10 women				
Poor Class	2 FGDs : 1 with 10 men and1 with 10 women				

Table 2: Surveys and FGD in Medenine

Medenine: 30 men and 30 women (All respondents were involved in livestock production)					
Middle Class (depending on number of livestock heads or land size, which was verified and defined by local institution representatives)					
15 men 15 women	3 of 10 men 3 of 10 women	3 of 10 women	3 men or more (at least 3)	4 or 5 out of 10 men 4 or 5 out of 10 women	4 or 5 out of 10 men 4 or 5 out of 10 women
	leaders (economic or institutional)	heads of households (due to widowhood, separation, divorce or migration)	heads of their households	participants in development programs	neither participants in institutions, businesses, or development programs
Poor Class (depending on number of livestock heads or land size, which was verified and defined by local institution representatives)					
15 men 15 women	3 of 10 men 3 of 10 women	3 of 10 women	3 men or more (at least 3)	4 or 5 out of 10 men 4 or 5 out of 10 women	4 or 5 out of 10 men 4 or 5 out of 10 women
	leaders (economic or institutional)	heads of households (due to widowhood, separation, divorce or migration)	heads of their households	participants in development programs	neither participants in institutions, businesses, or development programs

Medenine: 8 FGDs (All respondents were involved in livestock production)	
Middle Class	4 FGDs : 2 with 10 men and 2 with 10 women
Poor Class	4 FGDs : 2 with 10 men and 2 with 10 women

I. Literature Review

1. Women in Tunisia

Tunisia signed the "Convention on the Elimination of All Forms of Discrimination Against Women" (CEDAW) in 1980, and ratified it with reservations in 1985. Already in the 1980s, within the framework of the Eighth Development Plan, specific attention was given to women; a strategy to strengthen women's participation in productive farming activities was included. Since then, the advancement of women (especially the outreach to women in rural areas) has been an integral part of each 5 year plans of Tunisia. It has helped Tunisian women to know that the personal status law from 1956 which already gave women rights is further advancing: Tunisian women received the right to divorce, polygamy was abolished and a minimum age for marriage was set at 18 years old. Additional amendments in 1992 further reduced gender-inequalities in the Personal Status Law. Changes were also made to the Nationality Code, the Penal Code and the Labor Code.

In Tunisia, the institutional mechanisms for gender mainstreaming that have been implemented since the 1990s to institutionalize gender, are relatively low in terms of mandate, financial and human resources. The Centre of Research, Studies, Documentation and Information on Woman (CREDIF) was established in 1990 and mandated to provide information and gender-disaggregated data for policy makers and report on women's advancement in the country. CREDIF also runs an observatory to monitor conditions of women, and manages a training program on "Gender and Development" for Tunisian and African women as part of South to South partnership.

In 1991, the National Commission on Women and Development was established. Its mission was to design an overall strategy and multi-sector based programs for women and to prepare women's strategies for part of the usual 4 year national social and economic development plans. The Ministry of Women's, Family, Children's and Elderly Affairs (MAFF) was established in 1992 under the Office of the Prime Minister. It mandated that activities be coordinated for women at the national level. It was assisted by the National Commission for Rural Women as the key entity to reach out to rural women. Its mission is to elaborate a national strategy to promote rural women and to guarantee greater impact of the national plan for the promotion of rural women. At the same time, the National Council on Women and Family (CNFF) was founded. Additionally, a unit for Women's Professional Training was set up in the Ministry of Professional Training and Employment[1].

Despite all these organizations, it was obvious the occurrence of several development problems which can be linked or even summarized in the absence or insufficiency of programming at the central level and poor coordination between civil society, the private sector and government. In this context, it should be noted the lack of coordination between state parties and the civil society. The lack of a

[1] http://www.jica.go.jp/activities/issues/gender/pdf/e04tun.pdf

mapping of priority areas by region, locality and sectors, does not allow for targeted intervention with a comprehensive and strategic vision to act effectively against inequality and gender gaps including in agricultural production. As such, women empowerment and gender equality remained at the abstract level with limited operational significance.

2. Agriculture in Tunisia

Of Tunisia's 15.5 million hectares, 63% of land surface are regarded as "useful agricultural area," where crops can be cultivated and livestock grazed (Augustin et *al.*, 2012). Tunisia covers an area of 16.4 million hectares. Rangelands are common lands where livestock is grazed. These are lands owned by the government or by families or individuals. Rules for access and use are rarely studied let alone for gender and this is a distinct contribution for this study. The rangelands occupy about 5.5 million hectares, 87% of which are located in the arid and desert areas (45 and 42%, respectively). The remaining rangelands are in the semi-arid (9%), humid and sub-humid (4%) zones (Nefzaoui, 2004). However, recently APIA (Agence de Promotion des Investissements Agricoles) revealed that the rangelands decreased to occupy now 4.8 million hectares largely due to any factors such as: climate change, misuse of rangelands, etc.

Depending on the year, these rangelands contribute nowadays between 10 to 25% to livestock needs, compared to 65% in 1960 (World Bank, 1995; Nefzaoui, 2004). Rainfall is low and varies geographically throughout the year. Tunisian agriculture is primarily composed of small farms with declining acreage. 97 % of farms currently cultivate an area of less than 50 ha and more than half of all land-holdings farm on less than 5 ha. This decline in available land per farm went hand-in-hand with a 10 % increase in farm numbers over the last decade due to heritage. In Tunisia, olives are planted by almost a third of Tunisians farmers, followed by livestock (22 %) and cereal farming (15 %) (Augustin et *al.*, 2012).

The Tunisian agricultural sector is a main pillar of the national economy. It generates about 11.5 % of GDP, employs about 16 % of the countries' workforce and contributes to 14 % in the national level investments. It is the largest user of the Tunisians resources: 80 % of the countries water and 90 % of fertile land are used for agriculture. 40 % of the Tunisia's workforce is employed in agriculture and agriculture related work (Jouilli, 2011).

3. Women and Agriculture in Tunisia

In fact, women in Tunisian rural area have always actively participated in agriculture, working in fields, with livestock on the farm, and processing and storing products for household use and the market. In 2010, women comprised 26 % of the Tunisian labor force; a quarter of economically-active women were working in agriculture (Alani, 2004). Indeed, the real contribution of women to the agricultural sector would be significantly higher if the unpaid family labor would be reflected. In view

of the fact that women work primarily as unpaid family labor, their quantitative and qualitative contribution to agriculture has not been counted, or has been greatly underestimated, in statistics (WB Data, 2007-09 and FAO, 2010-11). As such, one of the contributions of this study is to shed light on women's roles, their contributions to agriculture in general and livestock production as well as their needs and aspirations.

The division of labor differs according to farming systems, local traditions and age. In areas where men are engaged in fishing, mining and commerce, or have migrated to urban areas or abroad for jobs, women take all farming tasks on essentially (Augustin et *al.*, 2012). Otherwise, in areas where agriculture is the main source of income in Tunisia?, the entire family is engaged in farming with the following division of labor: men are responsible for land preparation, digging pits and cisterns, irrigation, harvesting and livestock herding; women are responsible for hoeing and weeding, caring for livestock within the household enclosure, processing and storage of agricultural products. Women in Tunisia are responsible for all household tasks, including collection of water and fuel wood, used by about 20 % of households for cooking (Augustin et *al.*, 2012).

A 2011 FAO report on gender in agriculture calculates the costs for the persistent gender discrimination in agriculture "The yield gap between men and women averages around 20–30 %; most research finds that the gap is due to differences in resource use. Bringing yields on the land farmed by women up to the levels achieved by men would increase agricultural output in developing countries between 2.5 and 4 %. Increasing production by this amount could reduce the number of undernourished people in the world by 12–17 %. According to FAO's estimation in 2010, 925 million people are currently undernourished. Closing the gender gap in agricultural yields could bring that number down by as much as 100–150 million people" (FAO, 2011a).

Actually, FAO estimates the costs of the prevailing gender blindness in agriculture and the benefits, if the gender gap would subside: "If women had the same access to productive resources as men, they could increase yields on their farms by 20–30 %. This could raise total agricultural output in developing countries by 2.5–4 %, which could in turn reduce the number of hungry people in the world by 12–17 %" (FAO, 2011b).

II. Findings and field results

1. Grazing roles, access and control of rangelands and decision-making

1.1. Grazing roles with gender consideration

1.2. Gender roles and access to services

The analysis of the gender division of labor in Medenine and Zaghouen within this study illustrates how the type of farming system and livelihood affects the gender division of labor in these regions. In Zaghouen 17 men out of 20 and 16 women out of 20 also 26 men out of 30 and 25 women out of in Medenine reveal that work in agriculture in rural areas is characterized by a clear division of labor between the sexes and age groups.

Determining factors besides the gender system are means of subsistence, the size of the landholding, size and socio-economic situation of the family product pattern, place of settlement, and the connection with the city and its markets. A participant from Zaghouen said: *"Women in rural area do all the agricultural activities ... Everything ... She helps him in all the work ... Also I assure you that man in rural area who has no woman to help him cannot be farming alone... This is the reality... Who has a wife or a daughter by his side to help him finds himself ... with good cooperation."* With other words a man from Medenine expressed that women are considered as the principal labor force/ workforce in rural area, he said: *"Women are the backbone of farming in rural area"*.

Both women and men interviewed through individual surveys or participated in FGDs confirmed that women play an active role in livestock activities (17 men out of 20 and 16 women out of 20 in Zaghouen also 26 men out of 30 and 25 women out of 30 in Medenine). A woman from Medenine said: *"Women are the source of production at home. They are responsible for the raising of children and responsible for the household activities in addition to their agricultural tasks. For example, livestock care where they clean barns, watering and feed livestock, milking, weaning, care of weaned animals and care of new born animals"*. They are often responsible for most livestock nurturing activities and has role in on-farm livestock duties such as feeding, watering, fodder collecting, stable cleaning, milking and milk processing, caring for small and sick animals, poultry raising, wool work and traditional animal health care and most women's tasks are daily .

Woman might perform tasks in agriculture that are traditionally considered "male" if she is the head of household (generally with an absent male) or the family is too poor to afford to hired labor. With men in charge of feed animals purchase, marketing of animals and in some cases of milk and to deal with sell and purchase activities for both fodder and animals, women's mobility is limited and cash income is under male control. As one of women in Zaghouen said: *"I own nothing with him ... I work day and night and I clean barns and I graze in my private land at home and abroad ... and in the end I cannot find 0.5 TND in my pocket ... Thank God I eat and drink."*

Otherwise, women's primarily work in agriculture is home-based, and the prevailing gender division of labor, leaves women with modest influence in marketing and entrepreneurship. As one participant woman in Medenine confirmed the illustration: "*By virtue of the masculine nature of our rural society, women always bear the hardship of farming and domestic work, and do not get the reward they deserve. We as women receive less than men and less than the effort."*

In comparison with another woman entrepreneur from the same region she linked the access to training and funding as a key factor to succeed in a project or entrepreneurial initiative, she said: *"If I had a capacity building about livestock production before starting my project I might be able to avoid losing... Even the bank gave me training before obtaining the loan... But it was how to create a project; it was not specifically about how to raise livestock... I imagine that I will re-experiment with the poultry project after that I get trainings about it before applying for a loan".*

Gender Roles and Grazing

In regions of study, women are responsible also of herding and grazing in near or far rangelands or lands. It differs from region to another. For example in Medenine, 8 women from the interviewed 30 sample play an important role in herding and grazing for long or small distances and practise grazing in Dahar, a local public area for grazing livestock. Some 24 out of 30 interviewed women and 15 out of 30 interviewed men confirmed that in past the family (husband, wife and children) move to the communal rangeland (Dahar/الظاهر) and stay in temporary housing to graze their livestock freely and as a full-time job. For children who have formal education and have to go to schools, the oldest sister stay at their principal house playing the mother role in her absence and the mother / wife stay in the rangeland with her husband and little children for grazing livestock. Due to changes in social and economic situations (access to education, extra-agricultural work in different jobs, rural exodus), nowadays women and men continue to graze but in their private lands and in nearest places which became a daily activity not seasonal one.

Gender Roles in Marketing and Input Purchases

Otherwise, about 17 women out of 20 in Zaghouen and 27 women out of 30 in Medenine confirmed that men are responsible for marketing, shearing, animal feed purchasing and procuring veterinary services. 10 women who are heads of households (due to widowhood, separation, divorce or migration) out of which we have interviewed: 4 in Zaghouen and 6 in Medenine explained that they are the only responsible for all the activities and decisions concerning selling or buying cattle. One of the women head of household in Zaghouen said: *"I decide which animals I will sell, buy or slaughter. My son helps me to buy feed and grazing sometimes but I do everything… I sell milk and sheep to help my children and provide them with better livelihood".*

Regarding to the society norms and the tradition also the specificity of the market where sale and purchase is a male activity exclusively, she left this duty to male face in the family her brother-in-law, father-in-law, brother or son. 26 out of 30 interviewed men in Medenine linked this to the mobility and freedom in time management of men which facilitate to them the access and the control of market duties because the operation of sell may take long period. Besides, the purchase of agricultural inputs from the market or cooperatives is in all the studied cases delegated to male members of the household, even by women head of households. This is mainly due to the norms of the predominant patriarchal gender paradigm that limits women's mobility and contact with the public sphere, but also to rural women's limited education.

Findings from our study reveal that out of 60 women interviewed 44 (73%) identified that women are the responsible for production and man for marketing. An interviewed man from Medenine confirmed this finding and he said: *"These roles (to purchase fodders, to buy or to sell animals) are men responsibility because of their mobility and their access in cities men can easily purchase feed. For the livestock sale, this process requires hours to stay in the market and sometimes to sleep in the markets to guard cattle and we cannot send women to do this work or overnight in the street to guard cattle"*. This is in harmony with a 2010 FAO-IFAD-ILO study finds that a pattern can be discerned where women tend to be the main producers of food, while men appear to be managing most of the commercial crops; the latter often with significant and unpaid women's labor (FAO/IFAD/ILO, 2010).

Women and Assets

In Zaghouen, two cases from the sample, when the husband is labor migrant or he is doing an extra agricultural activity with small landholdings, the wife takes on the extra workload in agriculture including livestock production to sustain the family. They don't account this as work as they are not paid for it. However, when income from crops and livestock raising is insufficient or the income from male off-farm labor cannot sustain the family, most of women's products are immediately consumed for her and her family (children, parents…etc.), such as buying clothes, food …etc. These highly liquefiable assets, however, which women own are not recorded in rural statistics and hence most of their vital contribution to the national economy is "invisible". A man from Zaghouen confirmed this illustration: *"My wife owns 5 sheep that I gave it to her… and she often sells them if she needs something for the house. I mean, if she decides to buy an oven, she informs me and tell me that she wants to sell one of her sheep to buy the oven. I go to the market, I sell the lamb and I buy it. I give her the rest of its money"*.

Whereas, in other case livestock owned by women is often sold first as one of interviewed women in Medenine said: *"In fact, cattle are the property of the family, even if some are called as women's property. This remains formal to encourage women, but in reality the man is the*

administrator/manager of the sale, purchase and the money and everything, meaning that the woman owns the cattle but actually does not have the absolute discretion in her own cattle."

This may reveals that they have considerably less access to productive resources and opportunities than their male peers. The gender gap is consistent in all crucial assets: agricultural input and services, in land, livestock, market and marketing services. This may be explained from the quote of women from Medenine: *"As women, we suffer from inequality with men in rural areas, which, according to social custom and norms, deprives women of their rights, such as their right to own land, so that their ownership is not transferred by force of marriage to other families. But over the past 10 years, many of our villagers have recognized the right of women to inherit"*

This may be different when we mention women who have participated in programs, one of them revealed: *"A woman can own her own livestock, but when needed the man will spend the money alone. If a woman is strong, then no one will be able to control her money."* Another illustration from man in Zaghouen who confirmed that woman had her own project; she has the freedom to manage it: "*A woman is free to own cattle and her husband does not have the right to interfere in her affairs. For example, my son's wife is free to manage her livestock; she would sell her and behave in her money. My son does not interfere in the money of his wife and if he did not find what to eat he does not touch the money of his wife".*

1.3. Access to and control over rangeland / resources in agriculture

For many pastoralists, wealth is stored in livestock as a valuable form of household property. For pastoralists, livestock are a particularly important productive, cultural, and social resource with gendered socio-cultural meanings. Equitable ownership of, access to, and control over productive pastoralist resources such as land, livestock, property, and natural and development resources (e.g., technology, credit, information, social services, and justice) are reflective of gender power relations (Dankelman, 2002). About 88 % of interviewed (44 women out of 50 and 44 men out of 50) persons from both genders in Medenine and Zaghouen confirmed this and they confirmed also that ownership of, and control over livestock is often directly related to authority and bargaining power within the household, where men are generally privileged. To explain more, from 50 interviewed men in both regions out of xxx (xx %) only an aged man of 73 years and illiterate from Zaghouen insisted that women cannot own livestock as she belongs to her husband meaning she doesn't have her own identity. Answering the question if in general women in the community own livestock, he said*:" No, women don't have cattle. There is no woman in our region who owns cattle. It is impossible for a woman to own cattle; the property of her husband is her property. Will the woman dispute her husband and separate the property"*. All the rest interviewed men confirmed the right of women to own livestock but this is a reflection for men total control of owned livestock. About 8 women and 2 men in Madhhar (المظهار) in Medenine confirmed that the man as husband or father offers as gift such

number of livestock to the women as wife or daughter in the same household. An interviewed woman from the region who answered the same question said: *"Yes, she can own cattle. Women in Madhhar have 7% of herd, which is relatively small, because women get one or two sheep to encourage them to take care of the herd which is in fact a common property of the family"*.

In Medenine and Zaghouen, gender differences in the management and ownership of livestock and its products exist. In harmony with Flintan, 2007 and Kristjanson et *al*, 2010 research in Africa (Ethiopia and Kenya), differential gendered rights to access, produce, maintain, and use livestock resources often means that women have access to, and responsibility for, caring for livestock, but not necessarily ownership or control over decision making in relation to livestock consumption, sale, and exchange.

In two regions of study, in 4 from 6 of women FGDs findings reveal that without such rights, the incentive for women to invest in improving productivity and sustaining the environment in light of their other roles and labor demands diminishes, although they may in some cases be in a position to influence how animals are managed. In harmony with the discussions in FGD, one woman from Medenine confirmed this by saying: *"The rural area is dominated by masculine mentality. It is true that women are productive, yet they persist in a case of dependency, women are often absent from decision-making about the financial affairs of the family. It's my father and brother who decide to sell or buy animals and the management of incomes; it is true that they do not deprive us from anything, but as women , we have the ability to make major decisions as well"*.

The FGD in Gsar Hallouf in Beni Khedache (Medenine), the brainstorming with women reveal that in this region, women's lack of access to assets and resources evolves in a self-perpetuating cycle which only serves to strengthen already-existing gender biases in rural employment, production and marketing opportunities. They are facing hard challenges to make their voices heard, to have access to credit and knowledge, to invest in new technologies and to increase agricultural output with the labeling of low-levels of education and the lack of awareness. With the group consensus the illustration with their own words: "*About the training that we received about livestock feeding, we suffered from the fact that our parents and our husbands didn't accept the new information that we learned. They say that throughout their lives they feed the sheep in a way and you come after two or three days of training to tell us it's the wrong way? They did not accept this method until today, and despite the training, we feed always according to the traditional way that we have practiced since ancient times. They told, do not tell me not one hundred grams or two hundred ... So we think that accepting any new technology from us is very difficult especially for the elderly"*.

IFADs Near East and North Africa Division confirm, in their assessment, specific challenges they face working with rural women of the region. "These include women's limited mobility; high levels of illiteracy and traditional gender roles" (Rosemary and Ypeij, 2007).

1.4. Decision-Making in the household / Rangeland governance

The ability to make decisions on vital matters and to affect decision-making on the community level for resource allocation is an important measure of empowerment for women and men. Gender is a determining factor in a person's ability to make decisions which is summarized in the table below:

Subject of decision making	**Women**	**Men**	**Female headed households**
Decision about which sheep will be sold		X	X
Shearing		X	
Animal feed purchasing and time of purchasing		X	
Procuring veterinary services			
Feeding (quantity and timing)	X	X	X
Cleaning barns	X		X
Grazing	X	X	X
Owning livestock	X	X	X

Provision of labor does not go hand in hand with decision-making. In general a rule applies, that the more women are involved in agricultural activities, the more decision-making power they have (Valdivia, 2001). In our regions of study, women take care of animals, feeding, herding and cleaning it. Except the 10 cases where the women are heads of households (due to widowhood, separation, divorce or migration), women do not have much say about the principal decisions such as the purchase or sell of livestock, but they take care of the day-to-day decisions on stock production and livestock need. About 4 of interviewed men in Medenine aged between 70 and 86 years old reveal that women play the role of decision-maker about secondary or instantly activities while men play is the key actor and the main decision-maker about the principal decisions. An answer from an interviewed man of 65 years in Medenine about the main decisions that women make in agriculture especially about livestock rearing, he said: *"Women make decisions about their roles in livestock production: about feeding the cattle, they have the freedom to choose quantity and time; the choice of times barn cleaning and all daily activity related to the livestock"*. But he answered about the main decisions that men make: "*In fact, the last decision is the decision of the man, even if the woman expressed her opinion in some cases; she cannot express beyond her husband's decision. She must take her husband opinion about all the decisions. As men, we take big decisions such as the price of selling, buying times of feed, plowing the land and bringing workers to harvest olives means everything related to principal and essential roles. It's us who have the first and final decision about principal activities"*. Another illustration from Zaghouen of 60 years old man, he said: *"I am the one who decides everything. I have been married for almost fifty years. My wife did not decide anything and did not object me about*

anything". An average of 90% interviewed women in both regions, reveal that their opinion may be considered as a consultative and advisory due to their proximity of animals (feeding, cleaning, herding, etc.).

The FGD in Gsar Hallouf in Beni Khedache (Medenine), women described their access to and control of resources in agriculture and livestock as: *"We are the executive power and men are the legislative authority"*. This discrimination may carry heavy costs, for the individual women, their families, local communities and with larger loop to the development of the agricultural sector of the individual country.

While 6 of interviewed men in Zaghouen aged between 31 and 40 confirmed that the decision-making is a result of dialogue and discussion process a valuable consideration of women's roles and opinions. An interviewed young man with 31 years old confirmed this finding, he said metaphorical/figuratively: *"I "do not put a thread in the needle" unless we agreed together about it"*.

The decision-making depends on women/men profile which is related to her age and level of education. In Zaghouen, 9 women from 20 with age category from 50 to 78 years and in Medenine 11 from 30 women with age category from 50 to 75 years, they linked the decision-making with women profile which is related to her age and level of education. Actually, they revealed that there is a generation's gap, as the women is oldest and illiterate, her control, access, contribution and decision-making about livestock is less in comparison with younger and with primary level of education. In other hand, the larger and more valuable the animal, women's decision-making power on purchases or sales diminishes. For example, the sale of sheep and goats during the Muslim Eid to city residents is a male affair, generating cash for male family members but if the animals were owned by women the income is generated by men to her.

14 out of 20 women interviewed in Zeghouan and 21 out of 30 interviewed in Medenine felt that they were interested in being consulted about rangelands in their area. They attributed this to the need of taking in consideration their needs and opinions according to a participatory approach. While the rest felt they were not interested because of elderly, sickness, without direct involvement in rangelands.

2. Climate change implications and coping mechanisms

In pastoral and agro-pastoral systems, livestock is a key asset for poor people, fulfilling multiple economic, social and risk management functions. The impact of climate change is expected to heighten the vulnerability of livestock systems and reinforce existing factors that are affecting livestock production systems (Gill et *al*., 2009).

2.1. Climate change implications

The possible effects of climate change on food production are not limited to crops and agricultural production. Climate change will have far-reaching consequences for dairy, meat and wool production, mainly arising from its impact on grassland and rangeland productivity. Heat distress suffered by animals will reduce the rate of animal feed intake and result in poor growth performance (Rowlinson, 2008).

It was revealed that the presence of climate variability and change in Medenine by 26 women and 30 men and it is perceived by all the interviewed from both gender (20 women and 20 men) in Zaghouen. There is a general sense that seasons have been altered and that the cycle of wet and dry years is marked with more consecutive dry periods punctuated by shorter and insufficient wet periods in between. A collective agreement from different male or female participant in individual surveys and in FGD that they are living:

- An increase in temperature and increased frequency of drought
- The lack of water, fluctuations in precipitation, as well the frequency and duration of rainfall has decreased over the last decade

Temperature and rainfall are the major two variables for describing climate variability and change among agro-pastoral communities. They may be considered as key factors contributing to the degradation of dryland ecosystems and as a result of which there is less grass in rangelands. Precipitation also plays an important role in climate change. Scenarios with less precipitation are predicted to be less harmful. The field results that pasture and ecosystems are more productive with more precipitation are in harmony with IFAD Livestock Thematic Papers Tools about livestock and climate change (Calvosa et *al*., 2009).

In Medenine, 21 of interviewed women confirmed that the amount of rainfall directly affects the quality of grass in rangelands, with the quantity and quality in flat areas tending to be better than those on hillsides. They mentioned that when rainfall is abundant, the grasses in flat rangeland areas have the potential to meet the needs of their livestock. However, when rainfall is low, women herders graze livestock on the sunny hillsides in order to provide adequate grass for livestock.

Similarly, drought affects both the quantity and quality of grasses. In fact, grasses dry too fast under drought conditions. As a result, drought and erratic rainfall caused by unfavorable climatic conditions not only has impacts on grasses and water resources, but simultaneously and differentially affect men and women. As droughts have become more frequent in recent years, water sources in rangelands have become scarcer and their quality has decreased. In Zaghouen all of the case study sites, as women as men agreed about the problem of inexistence of drinking water in households. They buy water for household and agriculture activities. One of men in Zaghouen expressed as sympathy and even empathy with the stress and the tiredness experienced by the woman with scarcity of water: *"Women*

in rural area is marginalized… She lives in torment/torture… it's from morning to night and it is like a constant suffering… Lack of rain and lack of water impact her a lot ... She is tired physically and even psychologically... Sometimes, she cries from fatigue and oppression". Women reported in all of the case study an increase in water shortages, which has made the collection of water more difficult. Water shortages not only increase women's workload, but also have an adverse effect on household purchasing power. The male or female herders find themselves obliged to buy fodder to compensate the unavailability of rangelands as one of men in Zaghouen revealed*: "We cannot leave our sheep suffering from hunger and thirst; it is a heavy responsibility for me to reduce the expenses of the family and my children to buy fodder for livestock".* Similarly, another man from the same regions confirmed that he changed his livestock breeding strategy which became more dependent on feed: *"Changing the livestock breeding strategy, where the food system is totally dependent on feed"*.

In Medenine, from 60 interviewed persons respectively 28 men and 26 women observed that wetlands, which constitute a major source of biodiversity and grazing areas during winter and spring, are disappearing in the rangelands due to climate change. There is also a serious issue for the productivity of rangelands. The degradation of rangelands is affecting an increasing number of women and men. However, male and female headed households perceived and act or adapt with the change in different ways as explained below. These gender differences in the perception and reactions could be due to the different roles of male and females in household activities such as herding for men versus water collection for women in Zaghouen as example.

As the focus groups discussions in Medenine and Zaghouen reveal, relatively wealthier pastoralists build warehouses to store grasses in August for use in winter. However, economically poor pastoralists have to graze their livestock in rangelands even during winter. About 7 FGD from 12 agreed that the time spent by herds on a meadow has decreased significantly due to insufficient grass. Besides, the distance walked by men herders to graze their animals has increased due to a decrease in the availability of grasses in nearby rangelands as a result of drought. This has led male herders to frequently change grazing areas, which can be difficult and time consuming. They confirmed that men are stronger physically than women and they are able to walk further. As an interviewed women in Medenine confirmed that: *"Men do not participate in household activities, they have nothing to do at home, so they can spend more time in grazing; while, the woman is forced to return quickly to the house because of the laundry, cleaning and cooking activities."*

In other hand, men are more available and have more time to do that. In the sample interviewed, the gender division of labor allocates women the responsibility for most of the reproductive work in the household. The examples of 30 women from Medenine and 20 women from Zaghouen, their reproductive tasks are closely linked to subsistence agriculture and food security, such as food preparation, household activities can be extremely time consuming tasks that are often the

responsibility of women and in some cases children. This heavy work is back-breaking women and one of them said: "*I want to have more free time; I don't have time to breathe or time for myself, even to watch TV.*"

Another reason that forbids women from grazing in far rangelands and near mountains is the fear from terrorism as 9 interviewed persons (7 women and 2 men) from Zaghouen and 7 interviewed persons (4 women and 3 men).

Some 50% of FGDs in Zaghouen, 6 men out of 20 and 17 women out of 20 from the interviewed sample revealed that women, who cannot graze her animal for further distances, have more hours of additional work: cleaning and feeding duties to subsidy the grazing in rangelands. In other hand, those FGD revealed that the animals are more likely to be affected by external parasites. These kind of external parasites do not generally cause heavy mortalities unless the infestation is extreme, but they will cause loss of production if not controlled. Also, animals in poor health or low levels of nutrition are more likely to be affected and young animals are more susceptible, that's why an added charge of effort and time is more allocated by women to take care of their animals to protect them from this kind of health problems. Women in this case are obliged to spend added time to feed their animals and to clean their places. An interviewed woman who leads a project in Zaghouen confirmed: "*For women, this became harder and tiring because they were forced to feed more cattle. In the past, cattle tended to eat with grazing only a small amount of fodder. Today the main meal is made up of fodder, otherwise you lose the herd. This may keep them more time in barns and make women clean after frequently".*

Problem of animal feed / fodder:

Some of the indirect effects will be brought about by, for example, changes in feed resources linked to the carrying capacity of rangelands, the buffering abilities of ecosystems, intensified desertification processes, increased scarcity of water resources, decreased grain production. Other indirect effects will be linked to the expected shortage of feed arising from the increasingly competitive demands of food, feed and fuel production, and land use systems. All the interviewed women and men in both regions, revealed the problem of feed availability and its high prices.

The climate change may lead to the deterioration of natural resources, including water, rangelands, and natural vegetation, in Zaghouen 5 of interviewed men (aged between 70 and 80 years) don't graze and adopt feed compensation. The use of added feed quantity burdens the economic conditions of households. One of them said: *"I no longer prefer grazing heavily; it is a waste of time and effort. Because of drought and pastures degradation, when I leave my cattle for grazing they lose weight in mobility but they didn't eat enough and still hungry due to the lack of pastures. So I am obliged to purchase more fodders for them".*

This makes livestock farmers more vulnerable to and especially to fluctuations in supply and demand in the market due sometimes to the absence of subsidized fodder. Tunisian government provides subsidized forage (Barley and bran) to livestock owners to encourage domestic production of livestock. However, the subsidized fodder are not always available or even if available not with the appropriate quantity. In 8 cases from Medenine and Zaghouen, confirmed that they are obliged to sell one of their livestock to remain the rest. One of woman revealed: *"If I cannot find the fodder; I bought it from my nephew in Kridi (deferred payment) because I cannot leave the animal he is hungry ... I borrow and I do not leave my cattle hungry… Sometimes, I was obliged to sell from it to feed the rest ones".*

2.2. Coping mechanisms

The public authorities have been pursuing a long-term strategy of improving pastoral resources, which has been carried out largely via the Livestock Breeding and Grazing Agency (Office de l'Élevage et du Pâturage– OEP), which intervenes on pastoral plantations and aims to improve grazing conditions on private land as well as via the Forestry Directorate (Direction des Forêts), which is active on common as well as state-owned land (Elloumi et *al.*, 2006).

Coping mechanisms in Medenine:

- **Enclosure Management Systems on Rangeland "Dahar/الظاهر":**

The FGD with the GDA of Dahar reveals that: Dahar is the name of the communal private rangeland in Beni Khedache which covers more than 45 000 hectares. They mentioned that this land is legally owned by 4 ancestors' families in Beni Khedache: Bouabidi/بوعبيدي, Mahdhawi/محضاوي, Mahdawi/مهداوي and Mellouli/ملولي. However, by consensus Daher's land is used by the different herders in the region. Furthermore, the ministry of Agriculture leads a project of "Enclosure Management Systems on Rangeland" which began with the PRODEFIL[2]. This project can be in the form of rangeland rehabilitation or improvement and integrates preventing or reducing rangeland degradation; rehabilitating partially degraded lands or reclaiming desertified land. This is a kind of an ecological restoration to rejuvenate or accelerate the recovery of degraded rangelands in terms of health, integrity and posterity which aims to increase the productivity of pasture resources to the highest degree permitted by the local environment.

[2]PRODEFIL : projet de développement agro-pastoral et des filières associées dans le Gouvernorat de Médenine. (https://www.ifad.org/documents/10180/74dc3292-e738-42ad-a34f-0361b5aaf6ab)

The main objective of the project is to raise and improve the living conditions of Beni Khedache pastoralists. By working on the rehabilitation, development and use of the degraded pastures, the project aims so to protect and increase biodiversity. Otherwise, the main concern is to increase the yield of the area by adopting different developmental methods appropriate to the nature of the area whose pastures are to be developed. The adoption of the rest approach of rangeland is the fastest and most successful method of restoring the natural vegetation cover to its typical environment. For 1 to 3 years, the surfaces of 10 000 hectares pastures are restrained and instead the member's GDA of Dahar takes fodder as compensation. The criteria to benefit from the free fodder are according to the size of the herd. This method supports the planting or restocking of pastures by planting good pastoral species in sites that have reached an advanced degree of degradation by means of seed propagation and planting of pastoral plantations in suitable locations.

In the other hand, wells will be concentrated continuously in benefit of animals in the summer season, especially animals eating concentrated feeds. It's a way to avoid drinking hot water and the immaculate water. Moreover, the plan is to provide umbrellas (large tents) where animals can drink water and having fodder safely and in relatively cold place.

As next plan, they are working on the establishment/settlement of an integrated complex in the benefit of herders who use the rangeland of Dahar in long period and with big numbers. In purpose to offer more comfortable circumstances and conditions for herders, this complex will propose facilities and services: a nearby store to sell fodders and also food product, the availability of alternatives to use it (to reduce the problem of milling), good accommodation with TV, a good bed, warm or cold water, delivery of water in tanks or jars as well.

Furthermore, the project is installing sand barrier to develop pasture for grassland on the desert area, afforested between the sand dunes and pressed the sand on the rangeland area. This method is used to prevent the desertification, sand barrier are installing in sand dune to reduce the sand storm hazard as it involves sand fixation and improves the soil and recover ecosystem. The exclusion of human activity and animal grazing for a certain period of time, is a well-known management tool to restore grassland, degraded land, and desertified land ecosystems.

The objectives of different adopted methods are to foster the growth of plants, to help to increase plant communities in a short time. This in turn increases the soil organic matter content, which retains soil moisture and prevents adverse wind erosion (Shariff, 1994). Numerous studies have recently been carried out on the effects of duration or method of enclosure on the recovery of grassland ecosystems in arid lands and deserts (Wang et *al*., 2001).

- **Alternative natural fodder:**

The region of Beni Khedache in Mednine is located between Jebel Dahar and the Big Eastern Erg (Grand Erg oriental), thirty kilometers west of Medenine. These mountains are characterized by a wide variety of steppe-like vegetation: *Rosmarinus officinalis, Thymus vulgaris, Rhanterium suaveolens, Aristida pungens, Arthrophytum scoparium, Lygeum spartum, Stipa lagascae, Retama raetam,* etc. the low fodder potential of the area of study coupled with the degradation of natural rangelands resulted in excessive use of supplementary feeding for these reasons almost all the interviewed women and men from Medenine revealed that women collect from the nearest mountains (الجبل), dry and store these different plants in spring and used in autumn and winter and they called locally in Beni Khedache "*Khurtan/*خرطان ". According to Ammar et *al*, the feed energy production varies between 30 UF/ha/year (*A. scoparium*) and 60 UF/ha/year (*R. raetam*). In other hand, they collect *Cladium* mariscus which is a species of flowering plant in the sedge family known by the common names swamp sawgrass, they called locally "*Guedim/*حلفاء/قديم ".

As women defeat the climate change problems by preparing and storing "*Khurtan*" and "*Guedim*", men act differently, there are costs of increased workloads. Therefore, the low fodder potential of the area of study coupled with the degradation of natural rangelands resulted in excessive use of supplementary feeding. The herders use concentrate and subsidized feed supplements (barley and bran). This may result an increase of stocking rates which are far beyond the carrying capacity, thus aggravating range degradation.

Coping mechanisms in Zaghouen

In Zaghouen, and with different adopted approach, about 6 out of 20 interviewed women reveal that they use cactus as an alternative source of livestock feed and it's an exclusive female activity.. It's a government-run scheme administered by the Pasture and Livestock Agency (OEP) who provide subsidies to participating farmers. The subsidies are determined by growing area and compensate for lost income over a three-year period during which cactus plants are planted and become established (Louhaichi and Ben Salem, 2017).

In fact, cactus is easy to establish, maintain, and utilize in comparison with many other common crops and fodder. As cactus is suitable and available in the region as an alternative source of livestock feed, these plants are fragile and should not be grazed directly by animals. So the women's burden of work increased in case of smooth cactus: Cladodes should be harvested, cut into small pieces, and distributed to animals. However, when the cactus in thorny women must be heated before cutting which may take more time and efforts from women this is in agreement with a woman illustration in Zaghouen: *"Cactus is introduced in the feeding of cows in summer … But this tired me a lot… If I find the smooth (without thorn) it is better, but when I do not find I must cut it and burn it to make thorn*

disappear and then cut into small pieces that the cow can eat it … It takes me four hours a day to collect, burn and cut it".

Cactus is low in fiber and nitrogen, its effectiveness as a livestock feed can only be fully realized if it is mixed with other feedstuff: fibrous material, such as hay or cereal straws, and sources of nitrogen such as shrubby legumes, cotton seed meal, and sunflower meal. Conversely, cactus can be used to improve other unbalanced feed: the low energy and high salt content of Saltbush, for example, can be corrected by the high sugar and water content of cactus cladodes.

Shared coping mechanisms

- **<u>Reduction of livestock numbers:</u>**

Both gender in two regions respectively 9 women and 5 men in Zaghouen and 6 women and 11 men in Medenine confirmed that they reduced the livestock numbers. They did this as an act to reduce vulnerability to drought, increased heat and decreased rainfall due to climate change and to purchase feed. Under harsh climatic conditions and severe economic budget, decrease of herds' population is the most practiced strategy followed by breeders. This fact explains largely the procedure of selling kids at young age. This finding is in harmony with Ammar et *al* (please include the year) research in Tataouine even they revealed that besides health, poor producing ability of livestock usually can be attributed to critical nutrition and management constraints.

- **<u>Adoption of new breeds:</u>**

In Medenine and Zaghouen, one of the assumptions is that certain breeds or genetic resources are well adapted to local production environments. This may become more vulnerable when climate change will result in more variable and extreme circumstances. Locally adapted breeds have been developed over centuries and are well adapted to the local climate. However, production levels of local breeds are usually lower, compared to specialized, more widely used breeds. In Zaghouen, 2 women and 5 men confirmed that they changed the sheep breed from the local breed "Barbarine" to "Tibar/تيبار". An interviewed man from Zaghouen said: *"I reduced the herd size and I sold some of the white sheep (Barbarine) and bought black sheep (Tibar) because they bear better climatic changes than others"*.

In Medenine, 7 women and 11 men especially in Gsar Hallouf reveal that they changed the goat breed from the local breed "Arbi/عربي" to "Damascus/دمشقي". An interviewed man from Gsar Hallouf in Medenine reveals that: *"One of the most important innovations is the raising of Damascus breed, where the animal wealth occupies an important position in the agricultural sector in terms of production value. Damascus goats have a length of up to 240 days (8 months) and are characterized by high birth rates and very good production indicators (milk and twins)"*.

3. Aspirations for improving rangeland use and management

Livestock producers have traditionally adapted to various environmental and climatic changes by building on their in-depth knowledge of the environment in which they live. However, the expanding human population, urbanization, environmental degradation and increased consumption of animal source foods have rendered some of those coping mechanisms ineffective (Sidahmed, 2008). In addition, changes brought about by global warming are likely to happen at such a speed that they will exceed the capacity of spontaneous adaptation of both human communities and animal species (Thornton et *al.*, 2008). Through the different FGD in Medenine and Zaghouen, the following aspirations have been identified as ways to increase adaptation in the livestock management:

- **Livestock management systems.**

As the majority of interviewed women and men are unable to afford expensive adaptation technologies, they aspire to have access to and the development of efficient and affordable adaptation practices. These may include:

- In Medenine, provision of shade and water to reduce heat stress from increased temperature in rangeland (Dahar). Given current high energy prices, providing natural (low cost) shade instead of high cost air conditioning is more suitable. Besides, the idea to use solar water pumpsfor wells in rangeland. Solar water pumping systems can served two purposes: water supply on demand 24 hours per day and for large volume water supply for livestock watering and filling a large tank or;
- In Zaghouen, they need to have access to SONEDE (Société Nationale d'Exploitation et de Distribution des Eaux) for drinking water and for households need. It’s an urgent need for them to reduce the cost and the effort paid andburdens them. Whereas, in Medenine they seek to use an improved management of water resources through the introduction of simple techniques for localized irrigation (e.g. drip and sprinkler irrigation). In both regions, a common aspirations providing a suitable infrastructure to harvest and store rainwater, such as tanks connected to the roofs of houses and small surface and underground dams.

- **Breeding strategies:**

The majority of participants in FGD from both gender agreed that local breeds are already adapted to harsh living conditions. However, in Medenine and Zaghouen, they are usually characterized by a lack of technology in livestock breeding and agricultural programmes that might otherwise help to speed adaptation. They aspire to set adaptation strategies which may address not only the tolerance of livestock to heat, but also their ability to survive, grow and reproduce effectively in poor nutrition conditions, drought and potential parasites and diseases. Such measures may be able to include:

- Seeking for new methods of diversification, intensification and/or integration of pasture management, livestock and crop production introduced according to gender approach;
- Identifying and strengthening local breeds that have adapted to local climatic stress and feed sources. At the same time, identifying and enhancement of local (traditional) variety of fodder that may be a potential resource which adapt faster and easier produced and profitable;
- Improving local genetics through cross-breeding with heat and disease tolerant breeds (Tibar for sheep and Damascus for goat). If climate change is faster than natural selection, the risk to the survival and adaptation of the new breed is greater;
- Reducing the impact of extreme and variable climate conditions like heat stress by housing and management measures. In Medenine, some of herders are using the houses engraved in the mountain which may be considered as proper housing. This kind of housing is costly but it can prevent heat stress because temperature and air refreshment rate can be regulated automatically. 50 % of men FGD aspire to benefit of subvention program for improvement of housing and management which can be seen as a climate adaptive measure by itself;
- Taking into account the need to increase animal's productivity, together with climate change projections, they seek as an urgent need to strengthen collaborative research in genetics and nutrition. In other words, to better use genetic diversity, to improve thermal tolerance and animals toughness, and to make optimal use of available and potential natural resources. More research and coordination between research and field request is needed on both animals as systems and animals in systems with a loop on work division in household between women and men. An integrated approach is needed to improve efficiency and robustness of animals to adapt with climate change;

- **Capacity building for livestock keepers and herders:**

There is a need to improve the capacity building with gender consideration of livestock producers and herders to understand also deal with climate change increasing their awareness of global changes. These may include:

- Organizing training sessions in agro-ecological technologies and practices for the production and conservation of fodder may improve the supply of animal feed and reduces malnutrition and mortality in herds.
- Organizing regular capacity building sessions in favour to GDA, SMSA and groups to keep them updated with new knowledge, technology and techniques
- Organizing local and national competition to elect the best herder / livestock keeper to remain and bring their deserved value and social statue. Despite their importance, pastoralists are often marginalized and excluded from mainstream policy making and development processes.

If pastoralists are at the margins of development, then pastoralist women are at the 'margins of the margins' which may be considered as double marginalization

- One of interviewed women in Medenine suggested: *"If I were responsible in the Ministry of Agriculture, I would focus on making decisions to urge the government (Public sector) and associations (Civil society/Private sector) to work together to eliminate gender discrimination, achieve equal access to resources and opportunities, make women's voices heard and achieve women's economic empowerment in agriculture. The achievement of an agricultural development is linked to the increase of women's access to land, livestock, education, agricultural extension and financial support"*;

- **Institutional and policy changes:**

- Removing or introducing subsidies, insurance systems, income diversification practices and establishing livestock early warning systems could benefit adaptation efforts. Science and technology development with easy assimilation for both men and women with different level of education and age especially adaptable tools and materials for women in rural area;
- Working towards a better understanding of the impacts of climate change on livestock, developing new breeds and genetic types, improving animal health and enhancing water and soil management would support adaptation measures in the long term;
- Working towards the improvement of the subsidies fodders system and to better monitor the availability and the distribution channel. Besides, the work to avoid the monopoly and high prices of fodder in local market especially for women who suffer from intermediate trader who manipulate the women in buying fodders or in selling animals;
- In Medenine, more effective and active work with Enclosure Management Systems in Rangeland. They aspire to structure the rangeland system and to provide pastoral law and / or to develop a pastoral code to organize the rangeland use and management;

Recommendations

The literature review and field study clearly showed that female farmers are largely seen through the patriarchal gender lens that allocates roles and responsibilities irrespective of the everyday reality. The public extension system largely fails women farmers in their role as agricultural producers, and ignores their large contributions as unpaid family labourers and in subsistence farming. For these reasons and to ensure women farmers and their needs are integrated into extension and knowledge transfer it is recommended to:

- Move beyond gender stereotypes of women herders/farmers as helpers and housekeepers and identify women herders/farmer's needs. All of women farmers have clear needs for agricultural input, machinery and know-how that go well beyond food processing and home production. Public extension agents, private companies and civil society organizations need to recognize this fact and have to move away from the narrow picture of women as "agricultural helpers". For this paradigm shift to happen, the needs of women farmers must be identified and made visible. This can happen in agricultural research and in the planning phase of annual extension plans. Female extension officers can keep a log of their interaction with female farmers that are assessed quarterly and feed into the extension planning and potential pastoral code;
- Address the lack of gender disaggregated data of women's labour in agriculture especially in livestock production and rangeland management (paid, unpaid, home-based paid and unpaid, seasonality, causality etc.), through further collection of gender disaggregated data at the micro level using a combination of participatory, qualitative and quantitative methods and tools to assess the real impediments and opportunities of gender equality and women's empowerment;

- Main factors driving progress towards women's economic empowerment: Change in attitudes and awareness. These are of two types: those perceived by women about themselves and those perceived by others about women:
    - **Women's attitudes:** Changes in women's attitudes are among the most critical factors in driving progress and economic empowerment. Some of women in rural area still perceive themselves as inferior to men, which leads to fewer rights over resources and decision-making, a perception dominating societies working under patriarchal systems. Therefore working towards awareness sessions to help women perceive themselves as entire human beings that deserve recognition on the same basis of other members of the households, enabling them to perceive the range of options available to them, and building their capacity to choose from them constitute the start of any potential successful empowerment intervention. The development of indicators of agriculture women's labor empowerment in a participatory manner will contribute to increasing women's agency;
    - **Others' attitudes:** With no intention of breaking a working social system, changes should target the behavior of women's working for free taken-for-granted positions, the "normality" of women accepting their secondary roles, and the domination and support to legitimize the social prevailing order. Men and women should see each other as complementary and both important in society. Empowerment should be seen as individuals building constructive relationships through joint efforts and mutual support for better livelihoods and development;
- Develop a knowledge transfer strategy that includes all stakeholders and partners in the sector of rangeland and to clarify their role. This includes the governmental extension services in the Ministries of Agriculture, the private sector, the Agricultural Unions, Associations and Cooperatives (GDA, SMSA) as well as Civil Society Organizations;
- Women farmers often cannot rely on the same support networks than male farmers. Assisting women to either organize their own farmers groups or to enter rural cooperatives, GDA, SMSA and unions which remain crucial. There is a need to provide proper facilitators and networkers and link female farmers to relevant governmental programs, local NGOs, women's rights groups and donor programs. It's important also to coordinate with extension officers to play an intermediate role in facilitating women's membership in existing and potential agricultural structures and to help them to be involved in related affairs to rangeland management, governance an institutional plans;
- Design extension programs based on the needs of the different categories of female and male herders (not only male head of households) and involve local independent female herders, into the design of extension messages and approaches. As an example, In Afghanistan and Pakistan, an IFAD/ICARDA project has trained women trainers on hygienic milk handling, milk quality

control and milk processing with provision of the necessary equipment to women beneficiaries (Tibbo et al., 2008);

- Extension agencies often have women employed in rural areas to address women and gender issues. They are generally not trained about rangeland management, governance and livestock production, nor have the means to undertake their work properly and reach women of remote areas. Therefore, improving women's extension agents' capacities through gender awareness and gender analysis capacities in addition to transport and financial means to reach women workers in agriculture should be set among priorities. They will be able to address some tangible gaps through participatory means, identify opportunities to be addressed at regional levels, and assess time-use by gender, farming systems, differential agro-ecologies and livestock production;
- With the needs of female farmers identified, appropriate extension messages for women herders can be developed that include technical input and information, training on agricultural machinery, agro-ecological technologies and practices for the production and conservation of fodder and especially access to labour-saving devices;
- Independent female herders can serve as role models for women in rural area. Extension services should establish strategic partnerships with these herders to reach out to female herders in their community and beyond. Extension services could broaden their scope and provide extra support to women in their role as knowledge transfer agents. Support could include assistance to attend conferences and field demonstrations, provision of up-to-date research know-how, market linkages and participation in strategic planning meetings and policy formulation in the rangeland system;
- Development initiatives should combine increase in agriculture and livestock productivity band an income diversification for small farmers and rural women. This implies technical support through extension, linkage to micro-credit providers, capacity building in entrepreneurship skills, processing, marketing and access to non-agricultural sources of income;
- Greater flexibility in program design, planning, implementation and in institutional cooperation would allow better involvement of smallholder herders and rural women into development initiatives about rangeland and appropriate pastoral codes. This is especially important under climate change conditions and in dry land mixed farming systems. Under the prevailing gender paradigm integration of rural women, farming is a process that requires adaptation of project measures along with emerging needs and the ability of women farmers to develop their technical and personal capacities (hard and soft skills);
- Development projects in agriculture must be viewed as a learning process over time in which adjustments can be made built upon experience, lessons learned, changing needs and emerging opportunities according to gender approach. In fact, in an ICARDA's project (Larbi, et *al.*, 2011) on "Enhancing livelihoods of poor livestock keepers through increasing use of fodder", special efforts were made to target women farmers and housewives to play a greater role in small-scale

lamb fattening and dairying, to build their capacity in fodder innovation with an aim of contributing to their empowerment in Syria. After field day for women at El-Bab (Syria), an exchange visit to Salamieh and an implementation of many Awassi sheep fattening trials in different regions (Larbi et *al.*, 2011; Hilali, 2007). However, despite the good technical work, one option would be to conduct additional assessment of women's empowerment to further clarify the differential benefits of women and men within households;

- There is a serious scarcity of gender-disaggregated and socio-economic data for the agricultural sector and especially in rangeland and livestock sector. Reliable data is a prerequisite for a gender-sensitive analysis of the agricultural sector, livestock control and rangeland system. The latter is mandatory for policy formulation that addresses the needs of female and male farmers, develop socio-gender sensitive investment strategies for rural areas, and design equitable rural development policies;

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